

UNITED STATES PATENT APPLICATION

of

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for

MAPPING AN INTERNET DOCUMENT

TO BE ACCESSED OVER A TELEPHONE SYSTEM

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BACKGROUND OF THE INVENTION

1. Related Applications

This application is a continuation-in-part of U.S. Patent Application Serial No. 09/464,989, entitled "Voice Interface for Electronic Documents," filed December 16, 1999. This application also claims the benefit of U.S. Provisional Patent Application Serial No. 60/263,003, entitled "Choosit / User Defined Mapping," filed January 19, 2001. The foregoing patent applications are incorporated herein by reference.

2. The Field of the Invention

The present invention relates to methods and systems for enabling a user to map content of an electronic document so that the information can be accessed from an audio interface. More particularly, the present invention relates to methods and systems for enabling a user to identify and map regions of electronic documents containing text and links so that an audio representation of text located within selected regions and links can be easily accessed over a telephone system.

3. The Prior State of the Art

In recent years, the Internet has become an indispensable source of information for millions of people in their professional and private lives. For example, the Internet is used for email, banking, investing, shopping, news, entertainment, corporate networking, and social interaction. Not too many years ago, however, sharing information over the Internet was principally the domain of academia and scientists. At the time, the Internet was difficult to navigate and essential computer hardware was prohibitively expensive. However, the advent of user-friendly hypertext navigation and the World Wide Web ("Web"), in

1 conjunction with modestly priced and increasingly powerful personal computers, has
2 propelled the Internet to the forefront of public attention, making it the indispensable source
3 of information that it is today.

4 Like the Internet, the use of portable telephones (e.g. cellular and digital telephones)
5 has experienced tremendous growth in recent years. Initially, however, portable telephones
6 were not widely used because of problems that included providing coverage beyond major
7 metropolitan areas, the expense of purchasing a portable telephone device, the expense of
8 airtime for use, and for some people, because portable telephone devices were originally too
9 big to make them convenient. As a result, portable telephones were mostly used only for
10 vital business concerns rather than for personal matters. Over the past few years, however,
11 portable telephones have become increasingly more sophisticated, compact, and affordable.
12 As a result, portable telephone use has dramatically increased, and for many people, it is
13 now a primary means of communication.

14 The growing dependence on increasingly intelligent portable telephones, together
15 with the increasing dependence on the Internet as a source of information has created the
16 framework for the inevitable convergence of portable telephone use and the Internet. The
17 ability to access the Internet from a portable telephone is particularly beneficial for enabling
18 remote and mobile access to the Internet. The use of portable computers is one alternative
19 for enabling a user to access the Internet from a mobile or remote location. However, this is
20 not a practical solution for many people who cannot afford a portable computer. They also
21 are not nearly as portable as cellular and digital telephones. For instance, portable
22 telephones in general are smaller, less expensive and more plentiful than portable computers
23 and their battery life generally exceeds that of a portable computer. Furthermore, portable
24 telephones, unlike portable computers, can be used hands-free, while performing other tasks,

1 such as driving an automobile. Accordingly, it is desirable to enable Internet access from
2 portable telephone devices.

3 One unfortunate problem, however, is that portable telephones do not interface well
4 with the Internet. In particular, hypertext navigation of the Web is a two-dimensional and
5 visually oriented activity, which makes a computer with a relatively large screen an obvious
6 choice for access. A large screen makes it possible for a user to visually inspect the layout
7 of a document and to quickly find the information that he or she wants to read. This is not
8 possible, however, with a portable telephone because portable telephones are very small and
9 compact and have only a very small display screen, if any at all. This makes it impractical,
10 or impossible, to display a Web page on a portable telephone device in a way that is
11 conducive to user-friendly navigation of the Web.

12 One area that may be particularly well-served by telephone access to the Internet is
13 the personal home page market, as it is becoming increasingly popular for content providers,
14 such as Yahoo!, to offer personal Web home pages that enable a user to compile various
15 desired content into one location. For example, a user may chose to have current data
16 regarding various financial markets, weather, sports stories, headlines, technology,
17 calendaring, contacts, entertainment, travel, reference, etc., appear on a single personal
18 home page. By providing a single, convenient source of diverse information, these personal
19 home pages are highly attractive because, after requiring an initial investment of set up time,
20 they cut down the total amount of time a user would otherwise have to spend to find desired
21 information on a reoccurring basis.

22 A convenient way to access the Internet by telephone would be useful for anyone
23 who does not have constant access to a networked personal computer. It would also be
24 particularly beneficial to provide an effective audio interface to the Internet for enabling the

1 visually impaired to access the Internet from a portable telephone device that does not have
2 to be attached to Braille machinery.

3 To overcome the visual display limitations associated with portable telephone
4 device, techniques have been developed that enable a user to access audio representations of
5 Internet content. This is accomplished in one of two general ways, as illustrated in Figures 1
6 and 2. Either a Web page is modified to enable direct audio access from that page, or
7 alternatively, text-to-speech software is used to dictate information from a static translation
8 of an existing Web page.

9 The prior art solutions, however, are inherently incompatible with the two
10 dimensional format in which visual information is presented. In particular, audio is
11 presented in a linear format, as a function of time. This makes it very difficult for a user to
12 navigate through undesired information to find the information that is desired. Furthermore,
13 it is difficult to impossible for a user to quickly scan an entire Web page for a desired link or
14 for desired content when the Web page is dictated to the user. The sequential format, in
15 which audio is presented, makes navigation of the Internet with an audio interface a very
16 time consuming activity.

17 Figures 1 and 2 show the two general prior art approaches for accessing the Internet
18 with an audio interface. The first approach, designated as 100, in Figure 1, illustrates a
19 source 110 of electronic content that is accessible through telephone 120. The content in
20 source 110 is written in a markup language specifically designed for enabling audio output
21 through an audio interface. For this approach to work with existing Web pages, it is
22 necessary, however, that existing Web pages be translated into a suitable Voice eXtensible
23 Markup Language (VXML), such as Motorola's VoxML, which includes explicit elements
24 or tags for enabling voice interaction. Requiring explicit voice elements, however, presents

1 a serious drawback, namely, it does not provide a means for accessing content that does not
2 include VXML voice elements. Thus, VoxML fails to provide access to the wealth of
3 content already available on the Web, written mostly in HyperText Markup Language
4 ("HTML"). In other words, to provide full Web access, the entire content of the Web would
5 need to be rewritten to include explicit voice tags of a VXML. The difficulty of
6 accomplishing this task is further compounded by the fact that because there are several
7 existing VXMLs, and more potentially to be developed, it is unclear which VXML should
8 be used or will ultimately be adopted by the industry.

9 Figure 2 shows another prior art approach, designated as 200, for enabling a user to
10 access the Internet using an audio interface. As shown, HTML source 210, represents
11 existing Web content that can be accessed through visual and audio interfaces. First, as is
12 well known in the art, visual browser 220 provides a visual interface for monitor 230.
13 Second, static translation 240 provides an audio interface for telephone 250. Static
14 translation 240 is a copy of at least a portion of HTML source 210 that has been manually
15 altered to include audio elements. Someone examines HTML source 210, creates a
16 corresponding audio interface using Text To Speech (TTS) technology, and then stores the
17 audio interface in static translation 240. A user who is interested in accessing HTML source
18 210 through telephone 250 interacts with the audio interface provided by static translation
19 240.

20 The solution of Figure 2 has the advantage of providing an audio interface without
21 obligating HTML content providers (e.g., providers of HTML source 210) with the
22 responsibility of maintaining an audio interface. However, this approach imposes new
23 problems that may be nearly equal to the one it proposes to solve. Like the approach in
24 Figure 1, a significant amount of work must be devoted to identifying HTML content of

1 interest and then modifying it. Once the content has been initially modified, each time
2 HTML source 210 changes, corresponding changes must be made to the static translation
3 240. Naturally, some delay will occur between the time HTML source 210 changes and the
4 corresponding modifications are made to static translation 240. For content that changes
5 unpredictably, frequent and constant updating is a significant burden. Moreover, because of
6 the incredible amount of HTML content available on the Web, only a small portion could
7 practically be modified to include an audio interface and placed in static translation 240,
8 leaving vast Web content completely inaccessible to telephone 250 use.

9 Another problem for users of each of the foregoing techniques is that an Internet
10 document provider can load the static translation 240, or the VXML source 110 with
11 commercial advertisements that will ultimately be passed on to the user in audio form. This
12 is a problem, not only because a user may find the advertisements to be obnoxious, but also
13 because they can take up precious and sometimes expensive airtime associated with a
14 portable telephone service agreement. Advertisements that are displayed on a graphical
15 browser can be quickly viewed and dismissed, perhaps even unconsciously. However, audio
16 representations of the same advertisements are presented in a time intensive sequential
17 format that cannot be dismissed. This problem, however, is not limited to advertisements. It
18 occurs whenever a user accesses an Internet document that contains some information that
19 the user has no interest in receiving, but which is still included in the VXML source 110
20 coding or static translation 240 of the HTML code. As a matter of illustration, and not
21 limitation, if a user wishes to access financial data from a Web page containing an index or
22 table of financial data, and the user only wants to access selected portions of the Web page,
23 the user may have to wait and suffer through the dictation of undesired content before the
24 desired content is finally presented.

1 Accordingly, it would be desirable to enable a user to control how content from an
2 Internet document is presented through an audio interface. Currently, there is no end in
3 sight for the increasing growth of the Internet nor is it likely that the Internet's expanding
4 importance as a source of information will diminish any time soon. Considering the
5 corresponding growth in portable telephone use, providing users with controlled and
6 effective audio access to the Internet would be a great benefit. It would also be beneficial to
7 accomplish this without requiring modification to the existing source of HTML Internet
8 documents.

SUMMARY OF THE INVENTION

The present invention is directed to methods and systems for enabling a user to control how information is presented to the user through an audio interface. One advantage of the present invention is that it allows for user-controlled access to existing Internet, Intranet, and other electronic documents without requiring any modification to the content source of the electronic documents. Furthermore, the present invention allows for a user to control what portions of an electronic document will be accessed from a customized hierarchal structure. It should be appreciated that although certain embodiments of the present invention are described as applying to Internet documents and Web pages in an Internet environment, the invention is not limited to any particular format of electronic information or any particular type of network for accessing electronic content. For example, the methods and systems of the present invention can also be used to map Intranet documents, as well as files stored on personal computers. Similarly, the information that is mapped from the electronic documents can be accessed with any telephone system, not only cellular or wireless telephones.

In one preferred embodiment of the invention, a user creates a user-defined map from a user interface of a computer system that parses and displays Internet documents for mapping. With the user interface, the user selects a region of an Internet document to be mapped and designates whether the selected region corresponds to links or text of the selected region. The user also assigns a name to the designated links or text of the selected region. The present invention allows multiple Internet documents and regions to be mapped within a single user-defined map. It is also possible for a user to nest links and text in a hierarchal order, such that one region is mapped from the link of another mapped region.

1 A user accesses a voice browser over a telephone to listen to an audio representation
2 of mapped regions of an Internet document based on the user-defined map. Prompts and
3 global commands facilitate a user's navigation through the hierarchy of the user-defined
4 map. When the user makes a selection from the user-defined map, an audio representation
5 of the selected text or links of the Internet document is transmitted over the telephone to the
6 user. If content of a mapped region is modified subsequent to mapping of the region, the
7 updated content of the region is presented to the user.

8 The invention generally enables a user to control how content of an Internet
9 document is presented to the user through an audio interface, according to a hierarchy that is
10 defined by the user, without requiring any modification to existing content of the Internet
11 document, but accommodating for it.

12 One benefit of the invention is that it can significantly minimize the time that is
13 required for a user to access content from the Web by enabling a user to eliminate undesired
14 content from the sequential transmission of audio data that is transmitted to the user through
15 an audio interface. Minimizing the time it takes to access content from the Web is also
16 economically beneficial when access to the Web is achieved using a cellular or digital phone
17 with accompanying airtime costs. The invention is also beneficial to users for enabling
18 users to forgo listening to commercials and advertisements from the audio content that is
19 received. The invention is also beneficial for facilitating navigation of the Web over a
20 telephone, by enabling a user to control how content is categorized so that the user can know
21 exactly where to access the information that is desired.

22 These and other objects, features, and advantages of the present invention will
23 become more fully apparent from the following description and appended claims, or may be
24 learned by practicing the invention as set forth below.

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BRIEF DESCRIPTION OF THE DRAWINGS

A more extensive description of the present invention, including the above-recited features, advantages, and objects, will be rendered with reference to the specific embodiments that are illustrated in the appended drawings. Because these drawings depict only exemplary embodiments, the drawings should not be construed as imposing any limitation on the present invention's scope. As such, the present invention will be described and explained with additional specificity and detail through use of the accompanying drawings in which:

Figure 1 is a block diagram showing a prior art solution for providing a voice interface to electronic content;

Figure 2 is a block diagram showing another prior art solution for providing a voice interface to electronic content;

Figure 3 is a block diagram illustrating one suitable environment for enabling a user to map an Internet document to control how text and links of the Internet document will be presented to the user over a telephone system, including a telephone system, the Internet, a computer system having a graphical browser, and a server system having a mapping module, a voice browser, and a database;

Figure 4 is a block diagram showing increased detail of the components that make up the present invention associated with the mapping module and graphical browser;

Figure 5 is a block diagram showing increased detail of the components that make up the present invention associated with the voice browser;

Figure 6 is a flow chart illustrating an embodiment of the invention for creating a user-defined map;

1 Figure 7 is an example of electronic content of an Internet document that is displayed
2 on a user interface of the invention, and is used to describe the embodiments of the invention
3 for enabling a user to a map an Internet document to control how text and links of the
4 Internet document will be presented to the user over a telephone system;

5 Figure 8 shows a block diagram that illustrates the hierarchal organization of one
6 embodiment of a user-defined map;

7 Figure 9 is a flow chart illustrating an embodiment of the invention for enabling a
8 user to access content from the Internet that corresponds to a user-defined map;

9 Figure 10A is an example of electronic content of an Internet document that
10 corresponds to a mapped region of a user-defined map; and

11 Figure 10B is an example of modified electronic content of the Internet document of
12 Figure 10A that corresponds to the region of a user-defined map of Figure 10A.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is directed to methods and systems for enabling a user to define how an audio representation of electronic content is presented to the user through an audio interface. In particular, the present invention enables a user to control what portions of an electronic document will be presented to the user over a telephone system. More particularly, the present invention enables a user to create a user-defined map that includes a customized hierarchy of categories and mapped regions corresponding to Internet documents that can be retrieved by the user over a telephone to access Internet content corresponding to the user-defined map.

In one preferred embodiment, the invention enables a user to create a user-defined map from a user interface of a computer system that parses and displays Internet documents for mapping. With the user interface, the user selects and names a region of an Internet document to be mapped and designates whether the selected region corresponds to links or text of the selected region. Multiple Internet documents and regions can be mapped within a single user-defined map. It is also possible for a user-defined map to include mapped regions that are nested, such that one region is mapped from the link of another mapped region.

A user accesses an audio representation of mapped regions of an Internet document based on the user-defined map with a voice browser over a telephone system. Prompts and global commands facilitate navigation through the user-defined map. When a user makes a selection to access desired content, an audio representation of the selected text or links is transmitted over the telephone to the user. If content of a mapped region is modified after the region is mapped, the modified content is identified and presented to the user.

1 One particular benefit of the embodiment just described, is that it enables a user to
2 control how content of an Internet document is presented to the user over an audio interface
3 without requiring modification to the Internet document, but while accommodating for it.

4 It should be appreciated, however, that the invention is not limited to mapping and
5 accessing Internet documents. In particular, the methods and systems of the present
6 invention can also be used to map and access Intranet documents, files stored on personal
7 computers, and cached copies of files stored in storage medium.

8 Embodiments of the invention, as described herein, may comprise a special purpose
9 or general-purpose computer comprising various computer hardware. Embodiments may
10 also include computer-readable media having computer-executable instructions or data
11 structures stored thereon. Such computer-readable media can be any available media that
12 can be accessed by a general-purpose or special-purpose computer. By way of example, and
13 not limitation, such computer-readable media can comprise RAM, ROM, EEPROM, CD-
14 ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices,
15 or any other medium which can be used to store the desired executable instructions or data
16 structures and which can be accessed by a general-purpose or special-purpose computer.

17 When information is transferred or provided over a network or other
18 communications connection to a computer, the computer properly views the connection as a
19 computer-readable medium. Thus, such a connection is also properly termed a computer-
20 readable medium. Combinations of the above should also be included within the scope of
21 computer-readable media. Computer-executable instructions comprise, for example,
22 instructions and data which cause a general-purpose computer, special-purpose computer, or
23 special-purpose processing device to perform a certain function or group of functions. The
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1 computer-executable instructions and associated data structures represent an example of
2 program code means for executing the steps of the invention disclosed herein.

3 The invention will be described in the general context of computer-executable
4 instructions, such as program modules, being executed by a computer. Generally, program
5 modules include routines, programs, objects, components, data structures, or the like that
6 perform particular tasks or implement particular abstract data types. Moreover, those skilled
7 in the art will appreciate that the invention may be practiced with other computer system
8 configurations, including hand-held devices, multi-processor systems, microprocessor-based
9 or programmable consumer electronics, network PCs, minicomputers, mainframe
10 computers, and the like. The invention may also be practiced in distributed computing
11 environments where tasks are performed by remote processing devices that are linked
12 through a communications network. In a distributed computing environment, program
13 modules may be located in both local and remote memory storage devices.

14 Turning now to Figure 3, one suitable environment 300 for practicing the invention
15 is illustrated. As shown, a server system 310 is connected to the Internet 320, a computer
16 system 330, and a telephone system 340. The Internet is shown to include Internet
17 documents 350, which should generally be construed to include any Internet document
18 comprising electronic content. One skilled in the art will recognize an HTML source
19 document as one example of electronic content that is common to the Internet. It should
20 also be appreciated that the invention can be practiced with Internet documents comprising
21 other types of electronic content. By way of example and not limitation, other types of
22 electronic content include documents encoded in eXtensible Markup Language (XML) and
23 Voice eXtensible Markup Language (VXML). It should further be appreciated that the
24 invention is not limited in its application to documents located on the Internet, but can

generally be practiced on most types of network data and content that can be accessed from a browser.

In one embodiment, graphical browser 350 comprises a user interface that performs the acts that enable a user to map Internet documents 350 according to the invention. It should be appreciated that graphical browser 350 can be operated in connection with a common visual browser, such as Microsoft's Internet Explorer and Netscape's Navigator, which are both well known in the art. According to the current embodiment, graphical browser 350 initially retrieves or receives Internet documents 350 according to user input. Then, according to user input, graphical browser 350 maps selected regions from the Internet documents 350 to create a user-defined map and subsequently transmits the user-defined map to database 360 of the server system 310. Although database 360 is shown and described as being included within server system 310, it should be appreciated that the database 360 can also be located at a remote location.

According to another embodiment, graphical browser 350 comprises a user interface that operates only as a proxy for enabling a user to map Internet documents 350 with mapping module 370. According to this embodiment, all acts that are required for creating a user-defined map are performed at server system 310 by mapping module 370 upon receiving the required user input from graphical browser 350.

Figure 4 shows some of the basic components that make up mapping module 370. Document retrieval protocols 410 request and retrieve electronic content that is displayed on the user interface. Document retrieval protocols 410 are well known in the art of accessing electronic content, especially in the context of Internet documents. When a file from an Intranet or personal computer is mapped using the methods and systems of the invention, document retrieval protocols 410 preferably access and retrieve a cached copy of the file

1 from an Intranet database. This is preferred over accessing the file directly from a computer
2 harddrive because the computer may be periodically turned off, whereas the Intranet
3 database can be accessed at almost any time.

4 Document parsing 420 receives electronic content and identifies any text and links
5 included within the electronic content and is an example of processor means for parsing
6 electronic documents. Links are content elements that lead to other locations in the same
7 document or to other documents entirely. HTML links, for example, create locations within
8 a document's visual representation that may be selected to further explore the link's subject,
9 such a defining a word or leading to related material.

10 Prompt & command recognition 430 performs the acts that are necessary to
11 communicate with a user and to receive user input that defines how electronic content of an
12 Internet document is to be mapped. There are numerous prompts that the mapping module
13 can present to a user, such as "What is the address (URL) of the site you want to map?",
14 "Please enter a name for this bookmark", and "Do you want to add text or links from this
15 page?" These and other prompts, which can be displayed on the user interface according to
16 the invention, will be discussed more thoroughly in reference to Figure 7.

17 Command processing & mapping 440 compiles user input to generate a user-defined
18 map and transmits the user-defined map to a database. Command processing & mapping
19 440 may also perform various general control functions and coordinate the operation of
20 other components.

21 It should be appreciated that although components 410-440 are described as
22 generally pertaining to mapping module 370, that they may also be incorporated within
23 graphical browser 350 for enabling graphical browser 350 to perform the acts of the
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1 invention that are necessary for enabling a user to create a user-defined map of electronic
2 content.

3 Returning now to Figure 3, server system 310 also includes voice browser 380.
4 voice browser 380 provides an audio interface for a user to receive audio representations of
5 electronic content contained within regions of Internet documents 350 that correspond to a
6 user-defined map. Voice browser 380 can also operate independently of a user-defined map.
7 It may, for instance, provide audio content from the Web according to automatic mapping
8 systems and methods that are described in U.S. Patent Application Serial No. 09/464,989,
9 entitled "Voice Interface for Electronic Documents," filed December 16, 1999, which is
10 incorporated herein by reference. It should also be appreciated that voice browser 340 can
11 be used in conjunction with a visual browser to provide simultaneous visual and audio
12 output to users accessing the Web.

13 According to the invention, voice browser 380 is accessed by a user through
14 telephone system 340, which is generally defined herein to include any cellular telephone,
15 digital telephone, landline telephone, computer or electronic device having telephone
16 capabilities, and any other type of telephone device that currently exists or that may be
17 developed, and that is capable of interfacing with voice browser 380.

18 Figure 5 shows some of the basic components that make up voice browser 380.
19 Line/call manager 510 is responsible for establishing and maintaining telephone
20 connections. Modules for implementing line/call manager 510 are well known in the
21 respective art.

22 Speech recognition 520 interprets audio or voice data received from user input.
23 Speech recognition 520 can also interpret user input comprising telephone signals, such as
24 Dual Tone Multi-Frequency (DTMF) signals. Speech recognition 520 is an example of

1 processor means for receiving a command from a user. Modules for implementing speech
2 recognition 520 are well known in the respective art.

3 Command processing 530 executes user requests, performs various general control
4 functions, and coordinates the operation of other components.

5 Document retrieval protocols 540 request and receive electronic content of interest
6 and are examples of processor means for obtaining electronic documents and for following
7 links. Document retrieval protocols 540 are well known in the art of accessing electronic
8 content, especially in the context of HTML documents.

9 Document parsing and audio layout 540 receives electronic content and identifies
10 any text and links included within the electronic content and is one example of processor
11 means for parsing electronic documents. Document parsing and audio layout 540, according
12 to the invention, can also be used to retrieve a user-defined map 560 and to compare it with
13 an Internet document to determine what text and links of the Internet document are included
14 within the mapped region of the user-defined map. This can also be accomplished by the
15 components of mapping module 370, which are shown and described in reference to Figure
16 4. If voice browser 380 is used independent of the user-defined map 560 of the invention,
17 the audio layout portion of 540 organizes certain content of Internet documents into a
18 hierarchy, as an aid to navigation, and is one example of processor means for mapping any
19 text and links identified into one or more categories.

20 Text to speech module 570 converts text from Internet documents into speech that is
21 transmitted to the user over a telephone system and is an example of processor means for
22 generating an audio representation of electronic content. Text to speech 570 may also
23 include some prerecorded audio content including, for example, frequently used words,
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1 links, text, and prompts. Modules for implementing text to speech 570 are well known in
2 the respective arts.

3 One method of the invention for enabling a user to create a user-defined map of an
4 Internet document, or any other type of electronic document, can be accomplished by
5 performing the acts shown in the flow chart of Figure 6 and will be generally described in
6 reference to Figures 6-7.

7 Because each figure number is incorporated into individual references, i.e., reference
8 610 appears in Figure 6 and reference 920 appears in Figure 9, the specific figure number
9 may be inferred and therefore may not be explicitly identified in the discussion that follows.
10 It should also be noted that while the steps of Figure 6 are shown sequentially, there is no
11 requirement that one step be completed prior to the next step beginning. For example, the
12 act of comparing the user-defined map to the Internet document can occur prior to or
13 subsequent to the act of parsing the document.

14 In step 610, a particular document is requested and received. To accomplish this,
15 document retrieval protocols 410 may prompt the user to select or request a desired source
16 of information. Once a requested document is received, it can be displayed on display 700
17 of the user interface. In one embodiment, the prompt "Please enter the address (URL) of the
18 site you want to map" is entered in prompt field 710. A user enters commands and
19 responses to any prompts in response field 720. As shown, a response "www.yahoo.com"
20 has been entered within response field 720. Buttons, such as go button 730 can assist a user
21 in entering responses. Various buttons, may be used to assist the user, including Help, Back,
22 Forward, Yes, No, and Exit buttons. Each of these buttons and their corresponding uses are
23 well recognized in the computer industry. Once a user enters the Uniform Resource Locator
24 (URL) of the site that the user wishes to map and, in one embodiment, selects the go button

1 730, the requested document 740 corresponding to that URL is received and displayed on
2 display 700.

3 In one embodiment, requested document 740 includes information in various
4 categories, which is typical of personal Web homepages. The categories of requested
5 document 740 include portfolio category 750, weather category 760, and my front page
6 Headlines category 770.

7 Having obtained the requested document 740, document parsing 420 parses the
8 content, step 620, to identify any title, any text, any links, and any link names included
9 within the document. A link name is simply the text that forms the link. For example,
10 "weather" 761 is the link name of weather category 760. According to another embodiment,
11 however, document parsing does not occur until the requested document 740 is retrieved and
12 compared to a user-defined map, as described in step 950, of Figure 9.

13 Figure 7 illustrates how requested document 740 may look after it is parsed. As
14 shown, some portions of the requested document 740 are filtered out and ignored. Top
15 banner 780 and bottom banner 790 include a variety of images that are not particularly
16 suitable for voice interaction. Each of the category areas 750-770 may also include content
17 that is ignored and is not displayed, such as graphics. Other unsuitable content that is
18 ignored includes JavaScript, flash objects, and video. If a Web page only contains these
19 type of images then the Web page is not be displayed, but instead an error message of some
20 type is presented to the user.

21 Once the requested document 740 is parsed, certain text and links included within
22 the document are mapped, step 630. There are a variety of methods for identifying page
23 content that should be mapped and for categorizing the content into a structured hierarchy.
24 Several of these methods are described in U.S. Patent Application Serial No. 09/464,989,

1 entitled "Voice Interface for Electronic Documents," filed on December 16, 1999. Mapping
2 can also be accomplished, according to the present invention, by enabling a user to define
3 what content is mapped and how it is organized in a user-defined map.

4 A user creates a user-defined map of an Internet document, according to step 630 of
5 the invention, by performing the following acts: Selecting a region of the requested
6 document 740 to be mapped; indicating whether text or links of the selected region are to be
7 mapped; and naming the selected region so it can be identified and retrieved by the user at a
8 later time. It should be appreciated that these acts may be performed in any order and may
9 include additional acts, such as naming a bookmark associated with the requested document
10 740.

11 As a matter of example and not limitation, the following is given to illustrate how a
12 user might be prompted to map the requested document 740. Initially, the Prompt Field is
13 refreshed and displays the prompt "Bookmark Name." In response, the user enters a name
14 to associate the requested document 740 with a bookmark of the user-defined map. Next,
15 the prompt field 710 is replaced with the prompt "Is there any information here you would
16 like to map?" The user responds by entering "Yes" in the response field 720, or by selecting
17 a Yes button, if one is provided. The prompt field 710 is then replaced with the prompt "Do
18 you want to add text or links from this page?" The user responds by entering either "Text"
19 or "Links" in the response field 720, or by selecting an appropriate button. The user is then
20 prompted to "Select an area of text by clicking and dragging your mouse over the selected
21 text," or to "Select a link or group of links by clicking and dragging your mouse over the
22 group." Once a selected region of the requested document 740 is selected, and associated
23 with either text or links, the user is prompted to "Enter a name for this voicelink." A user
24 can then name the selected region according to personal preferences, which organizes the

1 associated links or text for easy access. After the user enters a name for the voicelink, the
2 set of prompts may be presented again, and may repeat until the user stops the mapping
3 process.

4 According to step 630, the user can also be presented with options that enable the
5 user to map Web pages that are linked from the requested document 740. For example,
6 when the user is prompted “Do you want to add text or links from this page?,” the user may
7 enter or select “No,” in which case the user is presented with the prompt “Using the screen
8 on the right follow the link to the page you want to map.” The user can then use standard
9 Internet navigation to find a linked page by selecting any of the links that are displayed. The
10 user can then map the linked page according to the process just described. It should be
11 appreciated that this enables a user to organize a hierarchy of nested links that depend from
12 one another.

13 In one implementation of this embodiment, a user responds to the prompt “Is there
14 any information here you would like to map?” by entering “Yes.” In response to the next
15 prompt, “Do you want to add text or links from this page?” the user enters “Links” and
16 subsequently selects region 772 of news category 770, which is highlighted. When
17 prompted to name region 772, the user enters the name “News” in response field 720. The
18 user then proceeds to map region 752 of category portfolios 750, which is highlighted. This
19 region, however, is mapped for text according to user input, and correspondingly named
20 “Portfolios.” In like manner, the user maps region 762 of weather category 760 and names
21 the selected region “Weather.” The user then terminates the mapping process by entering a
22 command or by selecting an appropriate button.

23 A visual representation of the user-defined map 800 that was created from the
24 example just given is shown in Figure 8. As shown, the user-defined map 800 contains a

1 hierarchy that includes a menu of categories 810. The next level, corresponding to the menu
2 of categories 810 includes news 820, portfolios 830, and weather 840. Each of these
3 includes text 850, 860 and links 870 that correspond to the regions that were mapped by the
4 user. As shown, the text 850, 860 and links 870 of the categories 820-840 do not include
5 text and links of the requested document 740 that are not located within the mapped regions
6 752, 762, 772. This is useful because it enables users to selectively omit content from Web
7 pages that they do not want to receive in audio form through an audio interface. This is
8 particularly beneficial when mapping a Web page other than a personal homepage that can
9 be customized by a user to contain only desired content.

10 According to the example of the present embodiment, the user did not nest or map a
11 Web page that is linked to the requested document 740. It should be appreciated, however,
12 that this is possible, as indicated by step 640. If a user does choose to map a linked Web
13 page to the existing user-defined map 800, then user-defined map 800 would include at least
14 one more level of in its hierarchy. It is also possible for multiple Internet documents to be
15 mapped into a single user-defined map. Multiple documents can be organized by
16 bookmarks or with categories of a user-defined map.

17 Once the user-defined map is generated, according to step 630 it is stored in database
18 360 of server system 310 where it can be retrieved and referenced or updated at any time. It
19 should be appreciated that even though the mapping process does require an initial
20 investment of time, it enables a user to quickly access content from the requested document
21 740 through a user interface on a reoccurring basis, saving overall time. This becomes even
22 more apparent by the following discussion related to how a user accesses content associated
23 with a user-defined map.
24

1 As described above, in reference to Figures 3 and 5, voice browser 380 enables a
2 user to access the Internet 320 from telephone device 340. One method of the invention for
3 providing a user with controlled access to the Internet 320 is illustrated by the steps or acts
4 in Figure 9. As shown, the first step 910 is to retrieve the user-defined map, which is
5 accomplished in response to user input, commands or requests that are received by voice
6 browser 380. User input or requests can include spoken words and signals that are
7 generated by pressing keys on a keypad. According to one embodiment, user input includes
8 key words that are spoken, such as "Internet," or "Connect me to the Internet." A user can
9 also be assisted with prompts. Upon receiving user input, speech recognition 540 interprets
10 the command so that it can be processed.

11 Voice browser 380 next presents the user with an audio representation of the mapped
12 regions of the Internet document based on the user-defined map in a chronological and
13 hierarchal order according to the structure of the user-defined map. This is accomplished,
14 for example, by prompting the user to select a category, step 920. For example, voice
15 browser 380 may present the user with the following audio content: "News" (pause)
16 "Portfolios" (pause) "Weather". Voice browser 380 can also assist the user by providing a
17 prompt such as "Please select one of the following..." The user enters a selection by either
18 speaking the selection or entering appropriate keys of the key pad as prompted. According
19 to step 930, if the selected category contains sub-categories, then user is also presented with
20 a prompt to select a sub-category. It should also be appreciated that instead of categories
21 and sub-categories, a user can be presented with prompts related to bookmarks or favorites,
22 of which categories may be a subset, or of which categories may be included.

23 The act of prompting a user for a category name, step 920, and the act of prompting a
24 user for links or sub-categories, step 940, can also be practiced in connection with

As a matter of example and not limitation, a user in communication with Voice Browser 380 selects “Weather” as the category from prompts that are presented to the user over the telephone. Document retrieval protocols 560 retrieves the requested document 740 and subsequently compares the user-defined map 800 to the requested document 740 to determine what content will be transmitted back to the user. If the content corresponding to the “Weather” is the same as the content that was originally mapped in region 762, then the user will receive an audio representation of the exact text that was mapped, step 970. An audio representation of the content that corresponds to mapped region 762 is generated by text to speech 520, and is subsequently played or transmitted to the user, step 970. In the present example, the user hears an audio representation of “Salt Lake City, UT 49...82F.”

1 If the content corresponding to the mapped region has been modified, however, then
2 the updated content of the mapped region is transmitted to the user. The following example
3 is given as a matter of illustration, and not limitation, to show how the invention
4 accommodates modification of content in the mapped region of a Web document. In this
5 embodiment, the news stories have changed since they were first mapped. It is common for
6 news stories and headlines to change daily. According to this embodiment, a user selects
7 "News" over telephone 340. Document retrieval protocols 560 retrieves the requested
8 document 740 and compares it to mapped region 772 of news category 820. Figure 10A
9 illustrates mapped region 1072 and corresponding links 1074, as originally mapped. Figure
10 10B shows mapped region 1072A and associated links 1074A that correspond to the new
11 news and an updated version of requested document 740, not shown. To accommodate the
12 greater number of news links 1074A, the updated region 1072A is spatially larger than the
13 original mapped region 1072.

14 Algorithms can be used to enable document retrieval protocols 560 to determine
15 where a mapped region begins and ends so that the mapped region can expand or shrink to
16 accommodate modifications to content of an Internet document. Otherwise, if a mapped
17 region were limited to spatial constraints during mapping, then desired content could be
18 bumped out of a mapped region or undesired content might be added to a region whenever a
19 Web page is modified. The present invention uses pointers, matching systems and
20 algorithms to determine where the beginning and ending of a mapped region is. One skilled
21 in the art will recognize that there are various suitable algorithms that can be used in
22 connection with the present invention. As a matter of example, one suitable algorithm
23 comprises the Diff algorithm, or the UNIX Diff algorithm.
24

1 It should be appreciated that the invention enables a mapped region to expand or
2 shrink while preserving the integrity of what is mapped between the start and end of the
3 regional boundaries, or tags. This is particularly useful when mapping a cached copy of a
4 file from a personal computer or an Intranet document. In particular, the cached copy of the
5 file that is mapped can be updated by a mirroring process, when backing up the files of the
6 computer or Intranet system, while preserving the integrity of the user-defined map of the
7 cached copy. This generally enables a user to get what is desired and only what is desired
8 from a mapped document, even when the document undergoes changes. It should be
9 appreciated that this feature of the invention also extends the life of a user-defined map, so
10 that it does not have to be updated every time a mapped Web page or electronic document is
11 modified. Periodically, however, a user may be required to update the user-defined map if
12 wholesale changes are made to the mapped document that cannot be accommodated for.

13 If voice browser 380 is unable to perform the acts as defined for any reason, such as
14 when selected regions or Web documents associated with a user-defined map become
15 obsolete, then voice browser 380 can default to an automatic system of parsing and mapping
16 Internet documents to enable the user to navigate the Web according to the methods and
17 systems described in U.S. Patent Application Serial No. 09/464,989, entitled "Voice
18 Interface for Electronic Documents," filed December 16, 1999.

19 According to the present example in which the "News" is selected, but the content
20 within the associated region 1072 has been modified, the user is presented with an audio
21 representation of the links 1074A contained in the updated region 1072A. Because region
22 1072A comprises links1074A, the user is also prompted to select one of the links 1074A.
23 Upon selecting one of the links 1074A, the text of the Web page associated with the selected
24

1 link is read to the user. At any time a user can navigate back and forth between the different
2 hierarchal levels of the user-defined map 800 by entering appropriate commands.

3 Even though the acts of Figure 9 are shown in a particular order, this should not be
4 construed as a limitation, but only as an example of one suitable order for performing the
5 acts. The method shown may also incorporate additional acts. For instance, during step
6 950, when the user-defined map is compared to the retrieved Internet document, the act of
7 parsing the retrieved Internet document may also be performed to facilitate the performance
8 of step 950.

9 The invention, as it has been described herein, generally enables a user to control
10 how content of an Internet document is presented to the user through an audio interface,
11 according to a hierarchy that is defined by the user, without requiring any modification to
12 existing content of Internet document, but while accommodating for it. The invention also
13 enables a user to access mapped regions of an Internet document according to a user-defined
14 map, even when content within the region is modified after being mapped by the user.

15 It should be appreciated that these benefits of the invention are advantages over the
16 prior art. In particular, the invention can significantly minimize the time that is currently
17 required for a user access content from the Internet, Intranet, or personal computer by
18 enabling a user to eliminate undesired content from the transmission of audio data that is
19 transmitted to the user. The invention also provides a user with more control over how and
20 what content is accessed from the Internet, Intranet, or personal computer through an audio
21 interface by enabling a user to control how content is mapped. By allowing a user to
22 categorize content in a user-defined map, the invention also enables a user to know exactly
23 where to access the information that is desired so that it can be accessed in a quick and
24 convenient manner.

1 The present invention may be embodied in other forms without departing from its
2 spirit or essential characteristics. As properly understood, the preceding description of
3 specific embodiments is illustrative only and in no way restrictive. For example,
4 embodiments that make specific reference to mapping and accessing Internet documents
5 should not be construed to limit the invention to mapping any specific format of electronic
6 document or any particular means of accessing electronic content, once mapped. The scope
7 of the invention is, therefore, indicated by the appended claims as follows.

8 What is claimed and desired to be secured by United States Letters Patent is:
9